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**THE MEASUREMENT OF HEALTH KNOWLEDGE
OF SELECTED FRESHMEN STUDENTS AT
VIRGINIA STATE COLLEGE**

Linda Anne Williams

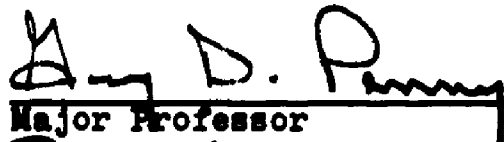
**A dissertation presented to the
Graduate Faculty of Middle Tennessee State University
in partial fulfillment of the requirements
for the degree Doctor of Arts**

May, 1976

THE MEASUREMENT OF HEALTH KNOWLEDGE OF
SELECTED FRESHMEN AT VIRGINIA
STATE COLLEGE

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ABSTRACT

THE MEASUREMENT OF HEALTH KNOWLEDGE OF SELECTED FRESHMEN STUDENTS AT VIRGINIA STATE COLLEGE

by Linda A. Williams

Health knowledge of selected freshmen students at Virginia State College was measured. The data was secured by administering the Bush Health Analogies Test for a Basic College Health Course to male (N = 200) and female (n = 290) freshmen enrolled in the required basic health course during the spring semester, 1976. Health content areas measured by the test were (1) Diseases; (2) Family Living; (3) Personal Hygiene; (4) Community Health; (5) Mental Health; (6) Tobacco and Drugs; and (7) Nutrition. Analysis of variance and Duncan's Multiple Range Test were used to depict significant differences between individual male and female test scores and group results for males and females on the seven content categories. Findings were: (1) the mean knowledge score of the total group was 48.66 compared to the Bush norm of 61.94; (2) male and female group responses revealed the content category Nutrition received the highest percentage of correct responses; (3) weaknesses in health knowledge were in Personal Hygiene, Family Living, and Diseases; (4) lowest correct

Linda A. Williams

response for males and females was for the category Community Health; (5) analysis of variance indicated there was no significant difference in health knowledge between males and females for the seven content categories; and (6) health knowledge differed significantly $p > .001$ between the males for the seven content categories and between the females for the categories. Instructional emphasis was recommended for the areas of Family Living, Tobacco and Drugs, Diseases, Personal Hygiene, and Community Health.

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Chapter 1

INTRODUCTION

Man has always been concerned directly or indirectly with personal and group health. Through the history of the human race there is evidence to indicate that health was one of the fundamental concerns of mankind. Even before the advent of the printed word, there were evidences which unequivocally suggested health as an important consideration.¹

Before the year 1000 B.C., the Egyptians stressed personal cleanliness, compounded pharmaceutical preparations, built earth closets, and laid public drainage pipes, all in the interest of better health. In the light of today's knowledge, these elementary practices appear to be of negligible health value, but they express the early efforts of man to live effectively and enjoyably.²

Promotion of health and prevention of disease has not been uniform throughout the world. The inequalities in health conditions that exist throughout the world are

¹Richard K. Means, A History of Health Education in the United States (Philadelphia: Lea and Febiger, 1962), p. 13.

²G. L. Anderson, School Health Practice (St. Louis: The C. V. Mosby Company, 1964), p. 18.

directly connected with the fundamental problems of wealth and poverty, which are linked with disease and prevalent cultural patterns.³ According to Smolensky and Brovenchio,⁴ one basis for these problems and inequalities is inadequate health education. Theoretically, health education leads to increased knowledge, positive health attitudes and practices, and thus fosters social advancement, economic development, organized health services, and personal happiness.

Early in the nineteenth century there were evidences to suggest that there was interest in health instruction in the United States. Leaders such as Alcott, Barnard, and Mann expressed concern for education in health.⁵ Mann's Sixth Annual Report appealed for physiology and hygiene as a part of the school curriculum. This was one of the first discussions of the educational value of a study of physiology and hygiene.⁶

The American Medical Association has stressed the value of beneficial health behavior since its founding in 1847 and strongly advocates a general program of health maintenance and disease prevention. The American Medical

³Jack Smolensky and L. Richard Brovenchio, Principles of School Health (Boston: D. C. Heath and Company, 1966), p. 2.

⁴Smolensky and Brovenchio, p. 2.

⁵Means, A History of Health Education . . . , p. 33.

⁶Means, p. 34.

Association emphasizes the value of health education as a key to good health.⁷

Over the years, the school's interest in health has increased and broadened. In 1918, the important place of health in the school program was crystalized and verbalized by a famous report on the "Cardinal Principles of Secondary Education" by a commission of the National Education Association. This placed health at the top of the list of seven major objectives of education.⁸

In 1938, the Educational Policies Commission, in its discussion of the "objective of self-realization," stated three ways in which a person should be health-educated: (1) the educated person understands the basic facts concerning health and disease; (2) the educated person protects his own health and that of his dependents; and (3) the educated person works to improve the health of his community.⁹

One of the most important responsibilities of the school is to health educate each individual to the place where he or she can intelligently direct his or her own health behavior as a responsible citizen.¹⁰ Most educators

⁷Ann Wesley Wallace, "American Medical Association," School Health Review, IV (September-October, 1973), 3.

⁸Health Education, Edited by Charles C. Wilson (Washington, D.C.: National Education Association, 1948), pp. 2-3.

⁹Health Education, p. 3.

¹⁰Smolensky and Brovenchio, p. 7.

agree that the school is the most logical social institution for disseminating health information to society because it should have the resources, personnel, and access to the latest reliable information published.

Health education in schools has had various behavioral goals over the years. Bucher¹¹ states that the earliest forms of health programs in the schools were evidenced in the latter part of the nineteenth century and were concerned primarily with the temperance movement. A large amount of time was devoted to discussing the ills of alcohol on the body. Means¹² and Anderson¹³ report that health education at the turn of the twentieth century was mostly interested in teaching facts about human anatomy and physiology. Next came the idea that the goal of total health education programs should be to medically inspect the schools and pupils to help control communicable diseases. Later, the medical examinations and screening processes were emphasized. Since the 1940's, the goals have stressed instruction, attitude formation, health habits, and behavior change. Students' needs, interests, and problems are an important part of present-day health curricula.

¹¹Charles A. Bucher, Foundations of Physical Education (St. Louis: The C. V. Mosby Company, 1972), pp. 205-206.

¹²Means, A History of Health Education pp. 73-142.

¹³Anderson, pp. 17-37.

Prior to attitude and behavior change or health-problem solution, the student must acquire health knowledge upon which to base his or her decisions. Jones¹⁴ believes that the health knowledge an individual possesses is an important determinant of health behavior.

A measurement of health knowledge indicates the amount of health information the student possesses. Testing health knowledge can reveal the level of understanding, amount of information, and also, misconceptions and deficiencies in information necessary for intelligent health decisions.

STATEMENT OF THE PROBLEM

This study was designed to investigate and evaluate health knowledge of selected freshmen students at Virginia State College, Petersburg, Virginia.

PURPOSE OF THE STUDY

The purposes of this study were: (1) to determine the health knowledge of freshmen students at Virginia State College using the Health Analogies Pretest for a Basic College Health Course;¹⁵ (2) to identify the course content

¹⁴The Health of Americans, Edited by Boisfeuillet Jones (New York: The American Assembly, 1970), pp. 102-109.

¹⁵Herman S. Bush, "A Health Analogies Pretest for a Basic College Health Course" (unpublished Doctoral dissertation, Indiana University, Bloomington, 1969), pp. 206-212.

needs of freshmen students in health education; and (3) to aid in curriculum design for the basic health course requirements at Virginia State College.

DELIMITATIONS OF THE STUDY

This study was limited to selected freshmen students enrolled in the required basic health education course at Virginia State College. Selected refers to those students who were enrolled in the required basic health courses, Spring Semester, 1976.

DEFINITIONS OF TERMS

Health science instruction. The organized teaching procedures directed toward developing understandings, attitudes and practices relating to health, and factors affecting health.¹⁶

Basic health course. The basic health course is a specific course offered in many colleges as a fundamental foundation course in health. It has been listed under such titles as Personal and Community Health, Principles of

¹⁶"Health Education Terminology," Journal of Health, Physical Education, and Recreation, XXXIII (November, 1962), 27.

Healthful Living, Personal Health and Hygiene, Personal Health, and General Hygiene.¹⁷

Health knowledge test. A health knowledge test is a test designed to measure what an individual or group knows and understands about health.¹⁸

Health knowledge. Health knowledge is the accumulated scientific facts, truths, principles, and information about health upon which the individual may base his attitudes and behaviors.¹⁹

Health education. Health education is "the process of providing or utilizing experiences for favorably influencing understanding, attitudes, and practices relating to individual, family, and community health."²⁰

Analogy test. An analogy test consists of objective test questions composed of a stem with two terms or statements which have a specific relationship. A third term is given for which the student must select a fourth term whose relationship to the third term is the same as that between the first two. There is a correct response and three

¹⁷Robert Reid Blackburn, "The Construction and Standardization of a Health Knowledge Test for College Students" (unpublished Doctoral dissertation, George Peabody College for Teachers, 1968), p. 12.

¹⁸Blackburn, p. 13.

¹⁹Blackburn, p. 13.

²⁰"Health Education Terminology," p. 28.

distractors to complete the analogy item. For the purpose of this study, Bush's Health Analogies Pretest for a Basic College Health Course was used.

Knowledge pretest. A knowledge pretest, given at the beginning of a term before health instruction begins, can disclose inaccuracies, fallacies, and gaps in health knowledge among students.²¹

BASIC ASSUMPTIONS

The researcher assumed the following: (1) that persons taking the test were college freshmen, having met entrance requirements of Virginia State College; (2) that the subjects had similar backgrounds in health; and (3) that the selected instrument could measure health knowledge in seven specific areas of health. The seven content areas measured by the analogy test were disease, family living, personal hygiene, community health, mental health, tobacco and drugs, and nutrition.

²¹Terry H. Dearborn, "A Plan for Pretesting in Health Education," Journal of Health, Physical Education, and Recreation, XXXV (February, 1964), 28.

Chapter 2

REVIEW OF RELATED LITERATURE

When literature on the measurement of health-knowledge was reviewed, it was found that health educators have been cognizant of the need for measurement and evaluation of health knowledge at all levels of education. Health educators believe that health curricula must be based on the needs, interests, and problems of the students. Appraisal of present knowledge can serve as a basis for determining course content and planning instruction so as to meet the needs of the student.

Studies Measuring Health Attitudes

It is possible and not too difficult to measure objectively the health knowledge of an individual. Because it is relatively difficult to measure health attitudes and practices, it becomes more important that it is understood that desirable attitudes and desirable practices are in general the result of health information.¹

¹H. Frederick Kilander, "Evaluating Health Teaching," Journal of Health, Physical Education, and Recreation, XXXII (November, 1961), 41.

Kilander² stated that a test can be administered at the beginning of a health course in a given grade to determine individual or group abilities or weaknesses in health knowledge or its application. Specific analysis of individual test items will identify health concepts that are in need of special attention.

Investigations of the prevalence of health misconceptions among college students revealed that the students subscribed to many health misconceptions.³ Sears⁴ administered a questionnaire to 555 students to determine whether or not the area of specialization had any relationship to health information. She found that subjects representing the College of Nursing adhered to the least number of misconceptions, whereas those subjects representing the College of Education expressed belief in the greatest number. Subjects were most informed in areas of mental health and nutrition and least informed in exercise and first aid.

²Kilander, p. 40.

³Barbara Anne Sears, "Health Misconceptions Among Students in Selected Components of the Texas Woman's University," Abstracts of Research Papers (1968-AAHPER Convention, April, 1968), 114.

⁴Sears, p. 114.

Dzenowagis, Borozne, and Irwin⁵ studied health misconceptions among prospective elementary teachers. They found that 50-60 percent of the group subscribed to 82 of the 218 misconceptions which were considered to be completely false and harmful as judged by a jury of experts. Their recommendations stressed that teacher-training institutions should place more emphasis on the teaching of health to prospective school teachers.

Garrett appraised the health interests of college freshmen women. He found that there was a lack of student interest in areas where misconception studies revealed a marked incidence of misconceptions.⁶

Andes⁷ constructed a questionnaire to determine the prevalence of health misconceptions among the adult public of an urban center. The data indicated that the adults held many health misconceptions and the prevalence varied with age, sex, education, and income.

Reading related literature produced several studies which indicated a relationship between socio-economic level

⁵Joseph G. Dzenowagis, Joseph Borozne, and Leslie W. Irwin, "Prevalence of Certain Harmful Health and Safety Misconceptions Among Prospective Elementary Teachers," Research Quarterly, XXVI (March, 1955), 44-48.

⁶Leon Garrett, "Health Interests after Five Years," Journal of School Health, XXXVI (January, 1966), 42-43.

⁷Anne G. Andes, "Some Health Misconceptions of Selected Adult Groups of Columbus, Ohio" (unpublished Master's thesis, Ohio State University, Columbus, 1965), p. 72.

and health information and misconceptions. One hundred fifty college freshmen were studied, seventy-five of whom were socioeconomically disadvantaged. The socioeconomically disadvantaged were found grossly inferior to other students in the matter of understanding concepts of health taught at the high school level. Data revealed 68 percent of the disadvantaged students resorted to unwritten sources of medical and health news. These students obtained very little health information from written sources outside the school. A much broader interest in health concepts was shown by culturally-privileged students than by the disadvantaged.⁸

A conducted study by Davidson⁹ revealed the existence of a relationship between ethnic-geographic-population stratification and consumer health misconceptions.

Males subscribed to more misconceptions than did females. A significant difference was found among the ethnic-geographic-population. The head of the household's occupation and the parent's education were significant factors in the prevalence of consumer health misconceptions. No significant difference existed in scores regardless of prior health classes.

⁸Dorwin K. Gillispie, "Media Source Use for Health Education," Research Quarterly, XXXVIII (March, 1967), 149-150.

⁹Alan Bruce Davidson, "A Consumer Health Misconception Survey of Juniors in Selected Washington High Schools" (unpublished Doctoral dissertation, University of Oregon, 1973), 121.

Cady¹⁰ studied a group of 361 college freshmen women. The subjects were predominantly lower middle class. Health knowledge and practices of the five social status groups were essentially similar and showed little relation to their religious affiliation or educational background of their mothers. Subjects from rural areas scored significantly higher in health knowledge than urban subjects.

Studies were found relating health knowledge to attitudes and practices. Kilander¹¹ stated the relationship between health information and health practices is, in general, positive. Those individuals who are better informed tend to have better health practices. The better informed college girls tend to eat better than their less informed female classmates when health knowledge and health practices were compared.

A study of health practices, attitudes, and knowledge of 15,480 pupils in Massachusetts found that the quality of their practices remained constant throughout the high school grades and that attitude scores increased only slightly between grades. While girls were found to have consistently

¹⁰Ruth Marie Cady, "A Study of the Interrelationships of Professed Health Practices, Acquired Health Information, and Socioeconomic Status of Freshmen Women with Implication for the Requirement of Health Instruction at Sam Houston State Teachers College in Huntsville, Texas" (unpublished Doctoral dissertation, Texas Woman's University, Denton, 1963), p. 96.

¹¹H. Frederick Kilander, "Health Knowledge," Journal of Health, Physical Education, and Recreation, XXXIV (May-June, 1961), 28-29.

better practice ratings than boys, no sex differences were found in knowledge or attitudes.¹²

Washnik¹³ states that his research data showed high school girls scored higher than boys on health knowledges and applications. The mean score for 626 females was 68.5. Boys' mean score was 65.5.

Bush¹⁴ administered a health knowledge pretest to 2,226 college students in the state of Kentucky. Girls scored higher than boys; mean scores were 65.10 and 59.32 respectively.

Lyons¹⁵ studied 1,583 health students and reported that sophomore women scored significantly better than sophomore men and freshmen women. Freshmen women's scores were significantly above freshmen men, but freshmen and sophomore men did not differ significantly.

The American College Health Association published a resolution on health education in colleges and universities. It stated as follows:

¹²Synthesis of Research in Selected Areas of Health Instruction, Edited by C. Harold Veenker (The School Health Education Study, AAHPER and NEA: Washington, D.C., 1963), p. 36.

¹³Walter M. Washnik, "What the High School Senior Knows About Health," Research Quarterly, XXVIII (May, 1957), 178-79.

¹⁴Herman S. Bush, "A Health Analogies Pretest for a Basic Health Course" (unpublished Doctoral dissertation, Indiana University, Bloomington, 1969), pp. 206-12.

¹⁵Majory D. Lyons, "Analysis of Health Knowledge of College Women" (unpublished Doctoral dissertation, State University of Iowa, 1961), p. 45.

Health instruction programs in colleges and universities offer a unique opportunity for the teaching of the necessary concepts and principles to students during their formative years; and whereas, in the current re-evaluation of college and university curriculums, it is important to give careful consideration to instruction in the science of healthful living; therefore, be it resolved, that the American College Health Association reaffirms its longstanding and fundamental belief that health education should be an integral and basic part of college and university curriculum¹⁶

Health instruction plays an important role in our colleges because it identifies social, emotional, and physical forces and explains how these affect the total functioning level (health) of individuals.¹⁷

Instruction in health not only influences the immediate level of well-being of an individual but also the future health status of his community. The student will become a functioning member of his community and through his personal health practices and beliefs he will influence the health of the community.¹⁸

Lussier¹⁹ conducted research to determine the needs of college students in 1970 as compared to a study of 1954.

Universities," Proceedings of the Forty-fourth Annual Meeting of the American College Health Association (San Diego, California, May 3-6, 1966), p. 14.
~~Meeting of the American College Health Association (San Diego, California, May 3-6, 1966), p. 14.~~

¹⁷Joseph F. Ocsodal, "Health Instruction in Community Colleges," The Journal of School Health, XI (June, 1970), 307-308.

¹⁸Ocsodal, p. 309.

¹⁹Richard R. Lussier, "Health Education and Student Needs," The Journal of School Health, XLII (December, 1972), 617-18.

The latter subjects listed four areas in the top ten which were not indicated by the students of 1954. They were: (1) Education for Human Sexuality; (2) Environmental Health; (3) First Aid; and (4) Specific Instruction in the Area of Venereal Disease. Data revealed that 71.5 percent of all students examined recommended that health education be a required course in all colleges, junior colleges, and universities. Recognizing that these students represented a wide spectrum of the college community, note that they are voicing a need for health education at the rate of three to one.²⁰

While educators have stated that health is one of the cardinal objectives of education, they have often failed to practice what they preach. One sees evidences of scientific advancement against death and disease, yet educational institutions fail to inculcate the extreme importance of sound health knowledges, attitudes, and practices. It should be the function of every school to share in the task of properly preparing each person for acceptance of responsibility for wholesome health behavior.²¹

Discussing sound health knowledge after analysis of thirteen selected college health textbooks, Irwin and

²⁰Lussier, p. 617.

²¹Leslie W. Irwin and Clifford A. Boyd, "A Determination of Concepts of Healthful Living and Their Relative Importance for a General Course in College Health," Research Quarterly, XXIII (March, 1952), 178.

Boyd²² reported that concepts of healthful living indicated in the texts were sometimes misleading and open to question as to their scientific accuracy and consistency with current and accepted medical knowledge and research.

STATUS OF REQUIRED COLLEGE HEALTH COURSES

The American College Health Association polled 1,157 institutions of higher education in 1953. It found that courses in health education were offered at 80 percent of the colleges with a student health service. Such instruction was required for all students at better than half of these institutions. A questionnaire study in 1960 of 75 four-year colleges reported that 24 (32 percent) required the course of all students. In an investigation in 1962 of 494 institutions, it was revealed that 60 percent provided such a course, over 7 percent presented it as an elective, over 33 percent to meet requirements of certain professional curricula, and nearly 21 percent required it to be completed by all undergraduate students.²³

There is little doubt that recent surveys, as contrasted with previous studies, indicate decreasing attention to health science instruction as a required course

²²Irwin and Boyd, pp. 177-96.

²³Richard K. Means, "Required College Health Education--Past and Present," Journal of Health, Physical Education, and Recreation, XXXV (September, 1964), 31.

in institutions of higher education. More importantly, there is strong evidence to suggest that a greater number of colleges and universities are discarding the basic required course than are adding it to the curriculum.²⁴

Oscosdal²⁵ surveyed New York State's two-year colleges. Sixty-eight questionnaires were mailed, 56 were returned. He found 25 colleges responded positively to offering a basic health course, 31 responded negatively. At 20 institutions, such a basic course was required of students either in their first or second year.

Dearborn²⁶ gave pretests to 12,000 college freshmen and sophomores at fifteen scattered universities, colleges, and junior colleges between 1951-57. Mean achievement score of only 44 percent at the junior college and 54 percent at the college level clearly demonstrated the need and responsibility to make health instruction available on the college level, and to improve such instruction in high school.

CURRICULUM DESIGN TO MEET STUDENT NEEDS

Everything done by the educator is meaningless if it is not directed at the needs of the learner. The efficacy of learning opportunities in health education is closely

²⁴Means, p. 31.

²⁵Oscosdal, p. 307.

²⁶Terry H. Dearborn, "Personal Health Knowledge of College Students Before Instruction," Research Quarterly, XXVIII (March, 1958), 154-59.

correlated with the accuracy with which the needs of students are perceived.²⁷

Most educators are in agreement that the health needs, interests, and problems of children and youth should serve as a basis for curriculum planning in health education. Studies that have been conducted and reported during the past several decades indicate that many individuals have been concerned with the task of identifying these health needs, interests, and problems.²⁸

Dearborn²⁹ suggested use of a health knowledge pre-test as a predictor of student needs. The survey findings of pretesting can provide a rational basis for the selection of appropriate subject matter and the placement of emphasis to meet the revealed needs of individual students.

A study of thirteen college health texts revealed little or no emphasis on the following important areas of health information: (1) old age; (2) rest and relaxation; (3) industrial health; (4) safety; and (5) growth and development.³⁰

²⁷Lussier, p. 618.

²⁸Synthesis of Research in Selected Areas of Health Education, p. 19.

²⁹Terry H. Dearborn, "A Plan for Pretesting in Health Education," Journal of Health, Physical Education, and Recreation, XXXV (February, 1964), 28.

³⁰Irwin and Boyd, p. 185.

Malfretti³¹ surveyed the problems of college freshmen to determine their health needs. As a result of the study, class discussions became more meaningful and previously broad areas could be discussed in greater depth. Course goals were better defined and concerns of students were stressed, thus a greater attempt to meet the needs of students.

A review of literature pertaining to measurement of health knowledge of college students revealed a need for health education. Studies indicated deficiencies in previous health science instruction.

Hinrichs³² administered proficiency tests to college freshmen and found that only one in every three which presented himself for course credit had the background or knowledge to pass with a grade of 75 percent. One in every twelve missed more than one-half of the total questions.

College freshmen were tested at Hunter College. Three areas of health knowledge displaying greatest weakness were (1) ocular hygiene; (2) dental care; and (3) foot

³¹James Luke Malfretti, "Selecting the Content of a Health Education Course on the Basis of Needs of Students," Research Quarterly, XXXVI (May, 1955), 163-69.

³²Marie A. Hinrichs, "Some Notes on a College Proficiency Test in Hygiene," Research Quarterly, XXIV (March, 1953), 18-21.

hygiene. Health educators reported a need to regroup course topics around real life situations.³³

The literature contained several studies conducted at the junior college level. Dearborn,³⁴ in 1973, tested 118 hygiene classes in thirty-four junior colleges in California. The pretest mean was 46.6 percent. This is 21 points higher than was found in a study of five junior colleges five years earlier. The low mean pretest score showed the need for a strong and helpful course in college to remedy deficiencies and to provide students with at least the minimum knowledge needed for informed health content. Dearborn recommended a score of 75 percent as the minimum health knowledge score to be considered acceptable among college graduates for intelligent decisions in health matters.

Results of Markovich's³⁵ compared junior college students at Sierra College with Dearborn's California results. It was found that college students recognized their ignorance in some areas of personal health information but clung to much misinformation in other areas; information

³³Annie S. Loop and Anne B. Tipton, "A Health Survey of Hunter College Freshmen," Research Quarterly, XXIII (June, 1952), 54-70.

³⁴Terry H. Dearborn, "Comparative Class Performance and Gains in Junior College Health Education," Research Quarterly, XXXIV (October, 1973), 299-303.

³⁵Theresa C. Markovich, "An Appraisal of Health Knowledge of Sierra College Students Enrolled in Health Education Classes for the School Year 1965-66" (unpublished Master's thesis, Sacramento State College, 1967), 90.

concerning health knowledge of students could be obtained through the use of a test instrument; and statistically, Sierra College students did not seem to exhibit marked differences from other California junior college students.

Carey and Rogers³⁶ studied community college students and found them to be a high-risk population from the public health viewpoint. The students showed a higher prevalence of health needs than was initially suspected and decreased ability to deal realistically with those needs. Suicide attempts, persistent marijuana smoking, unwanted pregnancies, and specific health problems were indicated as health problems affecting the health status of the students. Their health knowledge of health facilities available to them was very low.

³⁶Judith Carey and Lance Rogers, "Health Knowledge and Health Status of the Student in the Changing Community College," School Health Review, IV (July-August, 1973), 44.

Chapter 3

METHODS AND PROCEDURES

In this study, the investigator attempted to measure the health knowledge of 490 selected freshmen students at Virginia State College. Bush's pretest, developed at Indiana University, was used to identify the inaccuracies, fallacies, and gaps in health knowledge among the students. Test results were analyzed for men and women. Composite scores for both sexes were analyzed and interpreted to determine if a difference existed in health knowledge within seven general health areas.

SUBJECTS

The subjects used in the study included 200 males and 290 females enrolled in required basic health classes for the spring semester, 1976, at Virginia State College. All freshmen students at Virginia State College are required to complete one basic health course. The subjects were predominately black, ranging in age from 17 to 30 years. However, the majority of the students fell in the 17 to 20 age group. The subjects used in the study had no previous college health instruction.

INSTRUMENT

The instrument selected for measuring the health knowledge of the 490 subjects was Bush's Health Analogies Pretest for a Basic College Health Course¹ (see Appendix A). The pretest contained 100 analogy questions designed to measure the level of health knowledge of college students. The test questions were divided into seven health content areas: disease, family living, personal hygiene, community health, mental health, tobacco and drugs, and nutrition.

Bush² emphasized the following purposes for utilizing the test results: (1) to determine the level of health information of various classes and/or students to better ascertain how instruction should proceed; (2) to afford one criterion that will aid in assigning individual work to class members; and (3) to serve as a basis for correcting misconceptions.

Curricular validity³ of the instrument was established by several methods. The pooled judgment of ten health authorities was used by Bush to determine the scope of the analogies of the test. The first authorities utilized were the authors of selected college-level health tests.

¹Herman S. Bush, "A Health Analogies Pretest for a Basic College Health Course" (unpublished Doctoral dissertation, Indiana University, Bloomington, 1969).

²Bush, "A Health Analogies Pretest"

³Bush, "A Health Analogies Pretest"

Nine selected college health textbooks were used for a page count of the emphasis devoted to the various content areas. The textbook analysis also served as the second and final step in determining the scope of the test or the number of areas to be included. A selected jury of twenty-six health authorities rated 451 preliminary items as to importance as a refinement in establishing a table of specifications. As a result of this rating, the following seven areas of health content were selected: (1) disease; (2) family living; (3) personal hygiene; (4) community health; (5) mental health; (6) tobacco and drugs; and (7) nutrition. Thirty-five sub-areas were established for the seven areas, and each sub-area was rated by the same procedure as described above.

Bush⁴ determined the length of the test for the pilot study by considering the factors that influenced test length. These factors were the time available for administering the test, the form and length of the test items, and the thought processes involved in selecting an answer. After due consideration, the length of the test to be used in the pilot study at Union College was 100 items. A second pilot study was conducted to determine the time needed for the administration of the test.

Analysis of three preliminary test forms formed the basis for selection of the final test. The final test was

⁴Bush, "A Health Analogies Pretest"

administered to 2,226 college students at four-year institutions in the state of Kentucky. Mean score for the total population was 61.94. Sex was the only variable considered when the final test was reported. The range of scores for the composite group was 16-96. The standard deviation of the composite group was 15.413.⁵

The range of difficulty of items was 31.27-86.89 with a median difficulty of 60.77.⁶

Kuder-Richardson 20 reliability coefficient was 0.92. Standard error of measurement was 4.38. Spearman-Brown reliability was 0.91; standard error of measurement, 4.53.⁷

In accordance with the test validity, the pretest should be given no later than the third class meeting of the semester. The great majority of students may be expected to finish all items in less than 50 minutes.⁸

TESTING PROCEDURES

The test for measuring health knowledge was administered to fifteen sections of basic health classes offered in the Health, Physical Education, and Recreation Department at Virginia State College during the third class meeting.

⁵Bush, "A Health Analogies Pretest"

⁶Bush, "A Health Analogies Pretest"

⁷Bush, "A Health Analogies Pretest"

⁸Bush, "A Health Analogies Pretest"

An orientation meeting was held to acquaint the five faculty members who aided in administering the test with the purposes and procedures. A sample copy of the test, including test objectives, norms, and instructions was distributed to each of the five instructors. Each faculty member was asked to report the number of test booklets needed for his or her students. The test booklets needed were distributed to the faculty members prior to their sections' third class meeting.

The faculty members were asked to state the purposes of the test to their students and to explain the test instructions by reviewing the seven examples of analogy type questions appearing on the first page of the test booklet. A face sheet was attached to each answer sheet so as to be sure of obtaining information regarding age, sex, and class section.

STATISTICAL ANALYSIS

The data obtained from the health knowledge tests was analyzed with the help of the computer center at Middle Tennessee State University. After the investigator marked each answer sheet, each individual's test result was key-punched on IBM computer cards. A computer program was utilized to reveal mean scores, standard deviation, and percentage of correct responses in seven specific health content areas for men, women, and the composite of both.

Two-way analysis of variance was computed for the male and female groups and the seven health content areas to determine if there were significant differences between the male and female in health knowledge for the seven health areas. Duncan's multiple range was computed between group means for the seven health areas to reveal where significant differences in health knowledge exist.

One-way analysis of variance was computed for each group and the seven health areas to determine if there were significant differences in health knowledge in the seven health areas. Duncan's multiple range was then computed to determine where the differences in health knowledge exist.

Chapter 4

ANALYSIS OF THE DATA

Four hundred ninety college students were administered Bush's Health Analogies Pretest for a Basic College Health Course. Subjects were freshmen enrolled in the required basic health education course (HED 25 and GE 25) at Virginia State College, Spring Semester, 1976. Test results were analyzed to indicate deficiencies in health knowledge among students prior to instruction in the required health course.

The analysis of data is presented for men, women, and the total composite group. The analogy test questions are divided into the following seven general health knowledge content areas: (1) Diseases; (2) Family Living; (3) Personal Hygiene; (4) Community Health; (5) Mental Health; (6) Tobacco and Drugs; and (7) Nutrition (see Appendix C). Statistical analysis reported for each of these individual categories includes mean scores, standard deviations, and percentages of correct responses. Analysis of variance and Duncan's Multiple Range Test were computed to determine significant differences among males and females in the seven categories.

**CUMULATIVE FREQUENCY DISTRIBUTIONS OF
TEST SCORES FOR MALE, FEMALE,
AND COMPOSITE GROUP**

An analysis was made of individual test scores. The data obtained from 200 males and 290 females completing Bush's health knowledge test was utilized to produce cumulative frequency distributions for men, women, and the total composite group. The data is presented in Table 1.

Analysis of individual scores for males, females, and the total composite group revealed a range of test scores from 87 to 16 for males, 93 to 18 for females. The total group range was 93 to 16. Statistical treatment of data resulted in mean scores of 47.39 for males, 49.53 for females, and 48.66 total group mean. Standard deviations were 15.48 males, 13.81 females, and 14.54 composite (see Table 2).

Table 1
Cumulative Frequency Distributions for Men, Women, and
the Total Group on the Health Analogies Test

Raw score	Men		Women		Composite	
	Frequency	Cumulative frequency	Frequency	Cumulative frequency	Frequency	Cumulative frequency
93			1	290	1	290
92			1	289	1	289
88			1	288	1	288
87	1	200			1	200
86			1	287	1	287
85			1	286	1	286
82	2	199			2	199
80	1	197			1	197
79	3	196			3	196
78	2	193	1	285	3	478
77	1	191	4	284	5	475
76	2	190	1	280	3	470
75	4	188			4	188
74	1	184	1	279	2	463
73	2	183	3	278	5	461
72			3	275	3	275
71	2	181	2	272	4	453
70	2	179	2	270	4	449
69	1	177	1	268	2	445
68	1	176	1	267	2	443
67	4	175	6	266	10	441
66	1	171	7	260	8	431
65	4	170	3	253	7	423

Table 1 (continued)

Raw score	Men		Women		Composite	
	Frequency	Cumulative frequency	Frequency	Cumulative frequency	Frequency	Cumulative frequency
64	1	166	4	250	5	416
63	3	165	6	246	9	411
62	3	162	6	240	10	402
61	1	159	3	234	4	392
60	2	158	5	231	7	388
59	3	156	8	226	11	382
58	1	153	4	218	5	371
57	3	152	9	214	12	366
56			5	205	5	205
55	4	149	7	200	11	349
54	4	145	8	193	12	338
53	6	141	12	185	18	326
52	8	135	9	173	17	308
51	5	127	10	164	15	291
50			11	154	11	154
49	6	122	9	143	15	265
48	3	116	7	134	10	250
47	4	113	12	127	16	240
46	6	109	8	115	14	224
45	10	103	4	107	14	210
44	6	93	8	103	14	196
43	3	87	5	95	8	182
42	5	84	6	90	11	174
41	5	79	6	84	11	163
40	8	74	10	78	18	152
39	6	66	4	68	10	134

Table 1 (continued)

Raw score	Men		Women		Composite	
	Frequency	Cumulative frequency	Frequency	Cumulative frequency	Frequency	Cumulative frequency
38	1	60	7	64	8	124
37	5	59	8	57	13	116
36	7	54	4	49	11	103
35	3	47	4	45	7	92
34	8	44	2	41	10	85
33	1	36	5	39	6	75
32	1	35	4	34	5	69
31	3	34	6	30	9	64
30	6	31	3	24	9	55
29	8	25	5	21	13	46
28	1	17	3	16	4	33
27	4	16	2	13	6	29
26	4	12	2	11	6	23
25	1	8	1	9	2	17
24			2	8	2	8
23	1	7	1	6	2	13
22	1	6	1	5	2	11
21	1	5			1	5
20	2	4	1	4	3	8
19			2	3	2	3
18	1	2	1	1	2	3
16	1	1			1	1

Table 2

**Mean Range and Standard Deviation for Male,
Female, and Composite Test Scores**

	Number	Mean	Range	Standard deviation
Male	200	47.39	87-16	15.48
Female	290	49.53	93-18	13.81
Composite	490	48.66	93-16	14.54

**PERCENTAGES OF CORRECT RESPONSES FOR MALES,
FEMALES, AND TOTAL COMPOSITE GROUP**

In Table 3, the percentages of correct responses in each of the seven content areas of the health knowledge test are presented for the males, females, and total composite group. In the diseases category, the males' percentage of correct responses was 44 percent as compared to 48 percent for the females. The total composite group's percentage was 46 percent. The family living category revealed 45 percent correct responses for the males, 50 percent correct responses for females, and 48 percent correct responses for the total composite group. In the personal hygiene category, 45 percent and 42 percent of correct responses were reported for male and female, respectively. The total composite group's percentage of correct responses was 43 percent. The community health category revealed 40 percent correct responses for males, 41 percent for females, and a total composite group percentage of 40.5. In mental health, the correct

responses were 52 percent for males, 56 percent for females, and 54 percent for the total composite group. The tobacco and drugs category reported 50 percent correct responses for the males, 48 percent for the females, and 49 percent for the total composite group. The percentage of correct responses for the nutrition category were the highest of the seven content areas. Males had 57 percent correct responses, females 63 percent, and 61 percent for the total composite group.

ANALYSIS OF MALE AND FEMALE SCORES FOR THE SEVEN CONTENT AREAS

Two-way analysis of variance was computed from the results of Bush's health knowledge test given to 490 freshmen male and female students at Virginia State College. The analysis was between the male and female scores on the following seven health categories: (1) Diseases; (2) Family Living; (3) Personal Hygiene; (4) Community Health; (5) Mental Health; (6) Tobacco and Drugs; and (7) Nutrition. As presented in Table 4, the F-ratio of 2.47 was not significant at the .05 level, revealing no significant difference in health knowledge between the male and female students for the seven content areas.

An obtained F-ratio of 287.75, ($p < .001$) was significant for the within groups, indicating a significant difference in health knowledge between the males for the seven categories and between females for the seven categories

Table 3

Percentages of Correct Responses in the
Seven Areas on the Analogies Test

Diseases	Men	44	
	Women		48
	Composite	46	
Family Living	Men	45	
	Women		50
	Composite	48	
Personal Hygiene	Men	45	
	Women	42	
	Composite	43	
Community Health	Men	40	
	Women	41	
	Composite	40.5	
Mental Health	Men		52
	Women		56
	Composite		54
Tobacco and Drugs	Men		50
	Women		48
	Composite		49
Nutrition	Men		57
	Women		63
	Composite		61

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

Percentage

(see Table 4). F-ratio of 7.95 for interaction revealed there was a significant difference within the males in the seven categories and also a significant difference within the females in the seven categories.

Table 4
Analysis of Variance Results for Male and
Female Scores on the Seven Content Areas

Source	SS	df	MS	F	P
Total	30,833.14	3,429			
Between groups	14,581.14	489			
Groups--seven categories	73.31	1	73.31	2.47	N.S.
Error--between groups-categories	14,507.83	488	29.73		
Within groups	16,252.00	2,940			
Seven categories	5,966.71	6	994.45	287.75	.001
Groups X categories interaction	164.82	6	27.47	7.95	.001
Error					
Within groups--seven categories	10,120.47	2,928	3.456		

Needed for significance between groups .05 level, F = 3.84.

Needed for significance within groups .05 level, F = 2.09; .01 level, F = 2.80; .001 level, F = 3.74.

Duncan's Multiple Range test was used to determine if significant differences existed between male and female scores on the seven categories. Results of computation for Duncan's Multiple Range test is presented in Table 5.

Table 5

**Duncan's Multiple Range Test Results of
Male-Female Mean Scores for the
Seven Categories**

Category	Mean		Mean difference	R' .05	P
	Male	Female			
Disease	8.863	9.693	.830	.897	NS
Family Living	7.775	8.555	.780	.897	NS
Personal Hygiene	6.760	6.355	.405	.897	NS
Community Health	5.660	5.748	.088	.897	NS
Mental Health	6.830	7.293	.463	.897	NS
Tobacco & Drugs	5.555	5.348	.207	.897	NS
Nutrition	5.795	6.324	.529	.897	NS

Minimum mean difference (R) needed for significance at .05 level, R = .897.

**ANALYSIS OF THE MALE SCORES FOR
THE SEVEN CONTENT AREAS**

Analysis of variance was computed to determine significant difference in male scores on Bush's health knowledge test. Scores were obtained in the seven following categories: (1) Diseases; (2) Family Living; (3) Personal Hygiene; (4) Community Health; (5) Mental Health; (6) Tobacco and Drugs; and (7) Nutrition. An obtained F-ratio of 298.27, ($p < .001$) was significant between male scores in seven categories (see Table 6).

Table 6
Analysis of Variance Results
for Male Scores

Source	SS	df	MS	F	P
Total	3,214.00	1,399			
Between seven categories	1,807.49	6	301.25	298.27	.001
Within error seven categories	1,406.51	1,393	1.01		

Needed for significance at .05 level, $F = 2.09$;
 .01 level, $F = 2.80$; and .001 level, $F = 3.74$.

Duncan's Multiple Range test was used to locate the significance between the seven categories. Significant differences resulted between all categories except when comparing Community Health (5.66) with Tobacco and Drugs (5.55); Community Health (5.66) with Nutrition (5.795); and Personal Hygiene (6.76) with Mental Health (6.83) (see Table 7).

ANALYSIS OF THE FEMALE SCORES ON
THE SEVEN CONTENT AREAS

Female test scores, as a group, were analyzed. Results of analysis of variance for female scores from Bush's health knowledge test on the seven categories (1) Diseases, (2) Family Living, (3) Personal Hygiene, (4) Community Health, (5) Mental Health, (6) Tobacco and Drugs, and (7) Nutrition revealed significant differences between the

Table 7

Summary of Duncan's Multiple Range Test of Male
Mean Differences for Seven Categories

	Disease	Family Living	Personal Hygiene	Community Health	Mental Health	Tobacco & Drugs	Nutrition
Means	8.86	7.775	6.760	5.66	6.83	5.555	5.795
Disease	8.86	0	1.085***	2.100***	3.200***	2.030***	3.305***
Family Living	7.775	0	1.015***	2.115***	.945***	2.220***	1.980***
Personal Hygiene	6.760		0	1.100***	.070	1.205***	.965***
Community Health	5.66			0	1.170***	.005	.135
Mental Health	6.83				0	1.275***	1.035***
Tobacco & Drugs	5.555					0	.240*
Nutrition	5.795						0

Minimum mean differences (R) needed for significance at .05, R = .224;
.01, R = .2868; .001, R = .357.

*.05, **.01, ***.001

categories. An obtained F ratio of $F(6, 2029) = 110.26$, ($p < .001$) was significant, indicating that a significant difference existed between females on health knowledge within the seven categories. Table 8 presents the results of analysis of the data.

Table 8
Analysis of Variance Results
for Female Scores

Source	SS	df	MS	F	P
Total	17,545.83	2,029			
Between seven categories	4,324.04	6	720.67	110.26	.001
Within error seven categories	13,221.79	2,023	6.536		

Needed for significance at .05 level, $F = 2.09$;
.01, $F = 2.80$; .001, $F = 3.74$.

When comparing the female scores on the seven categories, significant differences were found to exist in all categories except when comparing Personal Hygiene (6.355) with Tobacco and Drugs (5.348); Personal Hygiene (6.355) with Nutrition (6.324); and Community Health (5.748) and Tobacco and Drugs (5.348). Results of Duncan's Multiple Range test on female scores are presented in Table 9.

Table 9

Summary of Duncan's Multiple Range Test of Female Mean Differences for Seven Categories

	Disease	Family Living	Personal Hygiene	Community Health	Mental Health	Tobacco & Drugs	Nutrition	
Means	9.693	8.555	6.355	5.748	7.293	5.348	6.324	
Disease	9.693	0	1.138***	3.338***	2.945***	2.400***	4.345***	3.369***
Family Living	8.555	8.555	0	2.200***	2.807***	1.262***	3.207***	2.231***
Personal Hygiene	6.355	6.355	6.355	0	.607**	.938***	.007	.031
Community Health	5.748	5.748	5.748	5.748	0	1.545***	.400	.516*
Mental Health	7.293	7.293	7.293	7.293	7.293	0	1.945***	.969***
Tobacco & Drugs	5.348	5.348	5.348	5.348	5.348	5.348	0	.976***
Nutrition	6.324	6.324	6.324	6.324	6.324	6.324	6.324	0

Minimum mean difference (R) needed for significance at .05, R = .472; .01, R = .606; .001, R = .755.

*.05, **.01, ***.001

Chapter 5

SUMMARY, FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

SUMMARY

For many years, educators have been concerned with the role of the school regarding health education. Most educators agree that the school is the most logical social institution for disseminating health information. Relevant health curricula must be based upon students' needs, interests, and problems. The ultimate goal of present-day health education is a change of behavior as a result of attitude change. Prior to attitude and behavior change, the student must acquire health knowledge as a basis for intelligent health decisions.

The purpose of this study was to investigate the health knowledge possessed by selected male and female freshmen students at Virginia State College. An additional purpose was to identify course content needs of freshmen students in health education.

The data was secured by administering Bush's Health Analogies Test for a Basic College Health Course to freshmen students enrolled in the required basic health course at Virginia State College, Petersburg, Virginia, Spring

Semester, 1976. Four hundred ninety black freshmen students were administered the test, 200 males and 290 females.

The health knowledge test was administered to all class sections of required basic health. Instructors of each class section assisted the researcher with the distribution, administration, and collection of testing materials.

The health knowledge test scores were divided and analyzed according to sex and total composite group response. Data was further grouped into the seven health content categories established by Bush: (1) Disease; (2) Family Living; (3) Personal Hygiene; (4) Community Health; (5) Mental Health; (6) Tobacco and Drugs; and (7) Nutrition.

FINDINGS

The summary of findings will be presented under the sub-headings of (a) Findings Based on Composite Test Results; (b) Comparing Composite Findings from Bush's Study to Virginia State College Study; (c) Findings from the Seven Categories Based on Male and Female Responses; (d) Comparing Male and Female Responses on Seven Categories; and (e) Findings Based on Tests of Significance.

Findings Based on Composite Test Results

Male and female individual scores differed in range, mean scores, and standard deviation. The highest individual composite score was ninety-three, which was scored by a female. The highest score for males was eighty-seven. Low

scores reported were females eighteen and males sixteen. Mean score of the total population was calculated at 48.66. Standard deviation for total group was 14.54.

Comparing Composite Findings from
Bush's Study to Virginia
State College Study

Results of an earlier study by Bush in Kentucky using the same instrument revealed a mean score of 61.94. The Virginia State College study revealed a lower mean score, although the range of individual test scores was similar. Bush's study indicated a range of 96-16, as compared to 93-16 for the Virginia State College study. Bush's study had a computed standard deviation of 15.413 as compared to 14.54 revealed by this study.

Findings from the Seven Categories
Based on Male and
Female Responses

Percentages of correct responses in the seven content categories of the test were calculated for males, females, and the total group. Investigation of male group responses revealed the category receiving highest percentage of correct responses to be Nutrition. The area of Mental Health ranked second in percent correct responses. The category Tobacco and Drugs (50 percent) ranked third in percent correct responses. The content areas Personal Hygiene, Family Living, and Diseases indicated similar health knowledge among males. Percentage of correct responses varied one percent

among the categories. The category receiving the lowest correct responses for males was Community Health.

Females scored highest in the Nutrition category (63 percent). The second highest in rank was Mental Health. Tobacco and Drugs category ranked third in correct responses for females. The categories of Diseases, Family Living, and Personal Hygiene received similar percentages of correct responses for females. Community Health category received lowest percentage correct responses (41 percent) for females.

Composite percentages for male and female responses to the seven content categories revealed the highest percentage of correct responses for Nutrition (61 percent), indicating that most health knowledge possessed by the total group was in this content area. Second in rank for the composite group was the category Mental Health. Considering the rank of this content area, the amount of health knowledge related to Mental Health is similar in males and females. Composite group responses for Tobacco and Drugs category (49 percent) ranked third in correct responses. Male and female responses differed by two percent, indicating similar levels of health knowledge were possessed by both groups. The categories Diseases, Personal Health, and Community Health received the smallest percentage of correct responses from the composite group. Community Health (40.5 percent) area reported the lowest in response of the seven areas for the male group, the female group, and the composite group,

indicating the lowest level of health knowledge possessed by the total group in this area.

Comparing Male and Female
Responses on Seven
Categories

When comparing percentages of correct responses for males and females at Virginia State College with Bush's study of nine colleges in Kentucky, the category of Nutrition ranked first. Male and female group scores were reported highest in Nutrition for both studies, indicating higher levels of health knowledge related to nutrition. Mental Health category ranked second for total populations in both studies, indicating similar levels of health knowledge for both populations. Bush's study reported content areas of Family Living, Diseases, and Tobacco and Drugs ranked third, fourth, and fifth, respectively. The Virginia State College population revealed the same three content areas for these ranks; yet, positions in rank order for the three categories differed. The Virginia study reported Tobacco and Drugs ranked third, Family Living, fourth, and Diseases, fifth. Results indicate somewhat similar amounts of health knowledge were possessed by the two populations. The low scores indicate a need for additional health instruction in the areas of Family Living, Diseases, and Tobacco and Drugs.

Data revealed lowest levels of correct responses for both populations resulted in the categories Personal Hygiene and Community Health. Bush's composite group reported equal

correct responses for the two categories (57 percent). Male and female individual groups for both studies scored lowest in the area of Community Health, indicating a need for increased emphasis in health instruction for community health and content areas directly related to the category.

Findings Based on Tests of Significance

Analysis of variance was computed for men, women, and total groups on the seven content categories. The obtained F-ratios for men revealed significant differences within the men, indicating health knowledge differed significantly between the males within the seven content categories. Duncan's Multiple Range Test was used to locate significant differences within the seven categories. Differences existed in all categories except when comparing Community Health with Tobacco and Drugs; Community Health with Nutrition; and Personal Hygiene with Mental Health.

The obtained F-ratio for females revealed significant differences between the seven categories, indicating health knowledge differed significantly between females. Duncan's Multiple Range Test was used to locate significant differences within the seven categories. Differences existed in all categories except when comparing Personal Hygiene with Tobacco and Drugs; Personal Hygiene with Nutrition; and Community Health with Tobacco and Drugs.

The obtained F-ratio from analyzing the total group (male and female) on the seven content categories revealed no

significant differences when comparing males to females between groups; but when comparing the within groups, significant differences were found, indicating that differences existed significantly within all categories except the categories of Personal Hygiene and Tobacco and Drugs.

CONCLUSIONS

The following conclusions are drawn from this study:

1. The health knowledge possessed by selected freshmen at Virginia State College is lower than those reported by Bush of freshmen students in the state of Kentucky.
2. The data revealed no significant difference in health knowledge of males and females on the test.
3. Freshmen males' and females' health knowledge differed significantly among the seven content categories on the test.
4. Freshmen students at Virginia State College have higher levels of health knowledge on the categories Nutrition and Mental Health when compared to the other content areas.
5. The content categories Family Living, Tobacco and Drugs, Diseases, and Personal Hygiene received lower percentages of correct responses, indicating a need for additional health instruction in these content areas.
6. The category Community Health ranked lowest of the seven content categories, indicating a need for increased instructional emphasis in all class sections of the basic health course.

RECOMMENDATIONS

Considering the results of this study, the researcher offers the following recommendations:

1. The basic health course at Virginia State College should be re-evaluated to emphasize instruction in all seven categories which were evaluated, with special emphasis in Community Health.
2. A health knowledge test should be administered periodically to determine if health content is meeting the lack of health knowledge in areas needing emphasis.
3. When the Bush health knowledge test is used to evaluate health knowledge, individual test results should be made available to students in an attempt to motivate learning.
4. Health knowledge test results should be made available to instructors for use as a basis for selection of course content for individual class sections of health science instruction.

The researcher suggests the following implications for additional study:

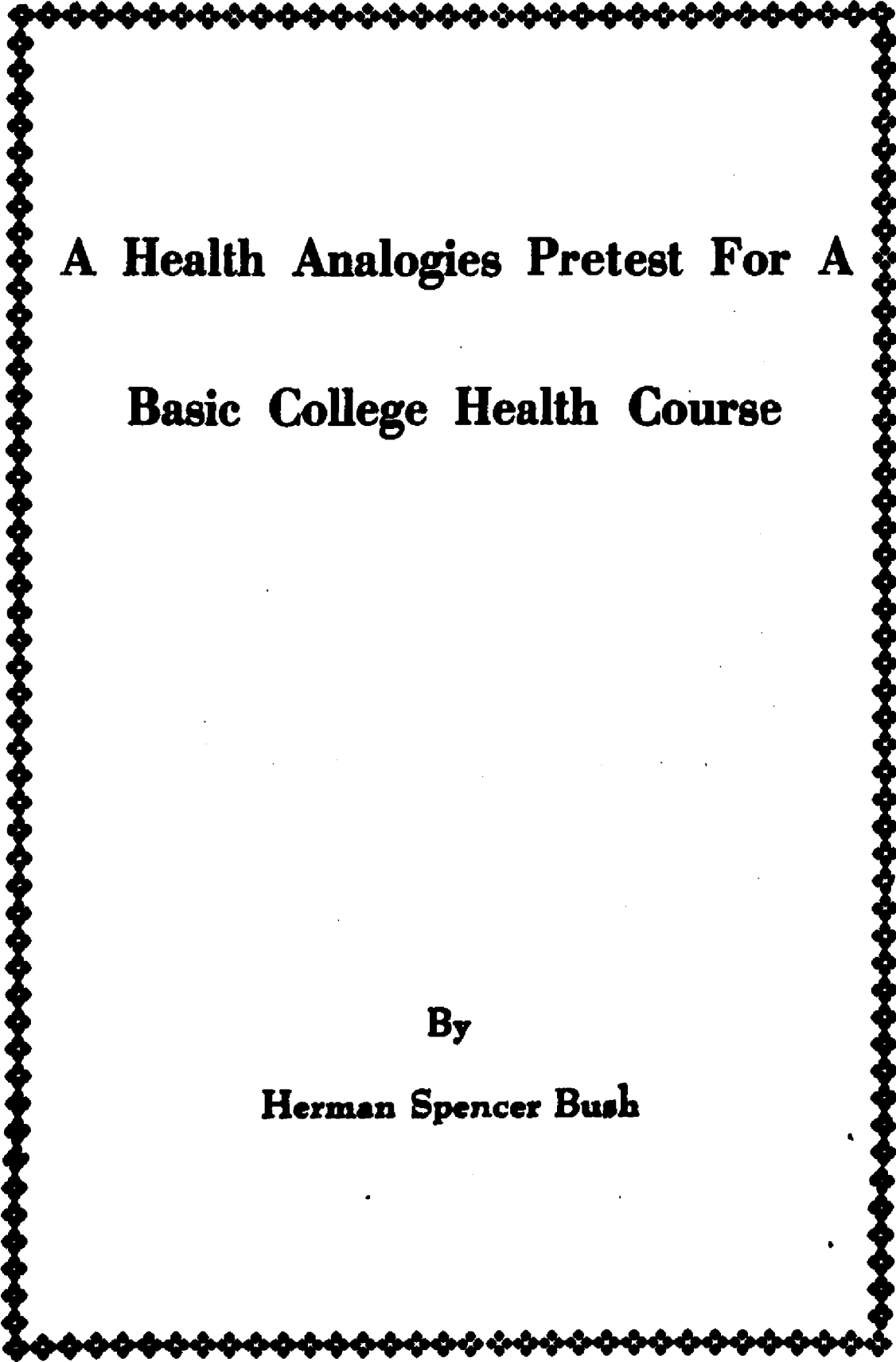
1. To administer a health knowledge test to a predominately white population in Virginia and compare the results with this study to indicate health knowledge based upon race.
2. A post-test should be utilized to determine the results of health instruction during the basic health course as revealed by the pre-test.

3. To investigate health knowledge in relation to pertinent background information, such as economic background, secondary health instruction, and geographical regions of the state.

4. Bush's health knowledge test should be revised to update content and delete questions which are outdated.

APPENDIX A
INSTRUMENT: A HEALTH ANALOGIES PRETEST
FOR A BASIC COLLEGE HEALTH COURSE

Used by permission of Herman Spencer Bush
Telephone conversation, July, 1975



**A Health Analogies Pretest For A
Basic College Health Course**

**By
Herman Spencer Bush**

Understanding Health Analogies Items

The analogy question is a challenging item that tests not only your knowledge, but also your ability to reason--to recognize relationships of things or ideas to other things or ideas.

The following information should help you in answering the questions:

1. In an analogy question, a colon (:) symbolizes "is to" and a pair of colons (::) symbolizes "as." The sentence, "An apple is to fruit as spinach is to vegetable," would be written as follows:

APPLE : FRUIT :: spinach : vegetable

2. Try to understand the relationship between the first two parts, then find the same relationship between the third part and among the answers. Each question has a best answer in regard to the relationship, although other answers may be partially correct.

3. Below are some examples of questions and the types of relationships you might encounter.

1. **VERTIGO : DIZZY :: toxin :**
a. immunity b. poison c. carrier d. antigen

Answer: b. (A word is compared to a synonym of the word.)

2. **COMMON COLD INCUBATION : 12-72 HOURS :: human gestation :**
a. 250-270 days b. 270-290 days c. 290-310 days d. 310-320 days

Answer: b. (A health fact is compared to the range of time normally required for completion.)

3. **WIND : HURRICANE :: gingivitis :**
a. malocclusion b. cavities c. pyorrhea d. angina

Answer: c. (A word is compared to an extreme degree.)

4. **ROCKEFELLER FOUNDATION : SCHOOLS OF PUBLIC HEALTH ::**
Kennedy Foundation :
a. muscular dystrophy b. cancer research c. population control
d. mental retardation

Answer: d. (An organization is compared to one of its interests.)

5. **KLEPTOMANIA : STEALING :: pyromania :**
a. contemplating murder b. igniting fires c. drowning
d. planning suicide

Answer: b. (A term is compared to an act it involves.)

6. **MANTOUX : TUBERCULOSIS :: breathalizer :**
a. alcohol b. tobacco c. marihuana d. heroin

Answer: a. (A test is compared to what it tests.)

7. **VITAMIN E : STERILITY :: vitamin C :**
a. goiter b. pellagra c. scurvy d. beriberi

Answer: c. (A vitamin is compared to the disease associated with its deficiency.)

PLEASE TURN THE PAGE AND BEGIN THE TEST

HEALTH ANALOGIES TEST

1. **FRAME : BONES :: power :**
a. muscles b. skeleton c. organs d. brain
2. **CLOUD : RAIN :: anxiety :**
a. hepatitis b. ulcers c. diabetes d. cerebral palsy
3. **OBSESSION : PERSISTENT IDEA :: amnesia :**
a. undue worry b. memory loss c. extreme fear d. daydreaming
4. **"H" : HEROIN :: "pot" :**
a. glue b. inhaler c. marihuana d. paregoric
5. **STROKE : BRAIN :: coronary thrombosis :**
a. heart b. kidneys c. liver d. colon
6. **SOMA : BODY :: psyche :**
a. torso b. mind c. skeleton d. id
7. **NON-MARITAL SEX : GUILT FEELINGS :: marital sex :**
a. selfishness b. anxiety c. exploitation d. satisfaction
8. **VITAMIN D : BONE GROWTH :: sugars :**
a. blood thickener b. skin development c. energy provider
d. tissue growth
9. **RIBOFLAVIN : LIVER :: vitamin C :**
a. eggs b. fats c. citrus fruits d. lean meats
10. **SPIRITUAL COUNSELING : MINISTER :: weight reduction :**
a. pharmacist b. chiropractor c. physician d. health food center
11. **MARRIAGE : MUTUAL LOVE :: infatuation :**
a. companionship b. friendship c. physical attraction
d. engagement
12. **THERMOSTAT : TEMPERATURE :: calories :**
a. digestion b. exercise c. height d. weight
13. **TENSION : RELAXATION :: frustration :**
a. goal b. satisfaction c. need d. motive
14. **IGNORANCE : EDUCATION :: disease :**
a. germs b. immunization c. epidemic d. microorganisms
15. **PATCH TEST : ALLERGIES :: pre-marital blood test :**
a. tuberculosis b. alcoholism c. cancer d. syphilis
16. **VISION : SNELLEN CHART :: hearing :**
a. telebinocular b. electrocardiograph c. audiometer
d. electroencephalograph
17. **LUNG CANCER : SURGERY :: mental illness :**
a. psychosis b. psychotherapy c. psychopathia d. psychosomatic
18. **MISHAP : ACCIDENT PRONE :: disease :**
a. vaccine b. attack c. immunity d. susceptible
19. **ABNORMAL : UNUSUAL COMPULSIONS :: normal :**
a. mistrust in friends b. giving and receiving love c. constant fears
d. no breaking point
20. **CLEANLINESS : GERMS :: fluorides :**
a. cavities b. mouthwash c. enamel d. toothpaste

21. "BLUE BABY" : CARDIAC :: gigantism :
 a. hereditary b. embryonic c. nutritional d. glandular
22. MEDICAL DOCTORS : SCIENTIFIC MEDICINE :: chiropractors :
 a. drugs b. surgery c. inoculation d. manipulation
23. CARBOHYDRATES : SWEETS :: proteins :
 a. meats b. starches c. fats d. vegetables
24. BURSITIS : BURSA :: arthritis :
 a. joints b. pain c. muscles d. stiff
25. INSPECTS ANIMALS : DEPARTMENT OF AGRICULTURE :: evaluates advertising :
 a. Bureau of State Services b. Bureau of Medical Services
 c. National Institutes of Health d. Federal Trade Commission
26. DIRTY WOUNDS : INFECTION :: serious injuries :
 a. concussion b. stroke c. fever d. shock
27. QUACKERY : TESTIMONIALS :: scientific medicine :
 a. observation and research b. advertisement c. free diagnosis
 d. guaranteed satisfaction
28. "OVER THE COUNTER" : NICOTINE :: prescription only :
 a. caffeine b. barbiturates c. solvents d. bromides
29. INFATUATION : SEX APPEAL :: mature love :
 a. in love with love b. sudden onset c. loss of appetite
 d. whole personality
30. HABITUATION : DESIRE :: addiction :
 a. stimulant b. tolerance c. compulsion d. convulsion
31. NEPHRITIS : KIDNEYS :: hepatitis :
 a. intestines b. diaphragm c. liver d. spleen
32. VASECTOMIES : MAKE STERILE :: contraceptive pills :
 a. create antibodies b. prevent ovulation c. counteract semen
 d. kill sperm
33. RED CORPUSCLES : CARRY OXYGEN :: white corpuscles :
 a. supply nutrients b. destroy bacteria c. remove wastes
 d. aid clotting
34. CUT : INCISORS :: grind :
 a. deciduous b. molars c. cuspids d. bicuspid
35. EASTER SEALS : CRIPPLED CHILDREN :: Christmas seals :
 a. tuberculosis b. heart disease c. cancer d. poliomyelitis
36. REST : REDUCES FATIGUE :: exercise :
 a. increases muscle fiber size b. increases number of muscles
 c. decreases lactic acid d. decreases tonus of muscle
37. SYPHILIS : CURABLE :: alcoholism :
 a. arrestable b. susceptible c. irreversible d. unalterable
38. EXERCISE : CIRCULATORY :: insufficient sleep :
 a. nervous b. respiratory c. excretory d. endocrine
39. METER : DISTANCE :: calorie :
 a. protein b. heat c. vitamins d. water

40. **FEMALE : OVARY :: male :**
 a. Bartholin's gland b. cervix c. seminal vesicle
 d. labium majora
41. **VACCINATION : SMALLPOX IMMUNITY :: planned, daily vigorous activity :**
 a. contagious diseases reduction b. muscle atrophy c. heart fibrillation
 d. muscle tone
42. **UNREAL ACTIVITIES : FANTASY :: persistent opposition :**
 a. projection b. egocentrism c. transference d. negativism
43. **NOCTURNAL EMISSIONS : INVOLUNTARY :: masturbation :**
 a. controlled b. evil c. automatic d. damaging
44. **HIGH CHOLESTEROL : FAT MEATS :: low cholesterol :**
 a. saturated fats b. cream and cheese c. unsaturated vegetable fats
 d. lard and margarines
45. **WORLD : PROTEIN DEFICIENCY :: United States :**
 a. obesity b. carbohydrate deficiency c. fat deficiency
 d. dyspepsia
46. **TYPHUS FEVER : LOUSE :: Rocky Mountain spotted fever :**
 a. tick b. spider c. flea d. mosquito
47. **WARM : HOT :: neurosis :**
 a. illness b. tension c. inhibition d. psychosis
48. **ALCOHOLISM : FAMILY DISCORD :: thalidomide :**
 a. prostate cancer b. leukemia c. blood clots d. malformed babies
49. **STOMACH CANCER : PERSISTENT INDIGESTION :: skin cancer :**
 a. pain b. fever c. gray nodule d. weight loss
50. **RESTED : ALERT :: fatigued :**
 a. less accident prone b. high toxic condition c. low disease resistance
 d. high "boiling point"
51. **MARIHUANA : HALLUCINATIONS :: excessive alcohol :**
 a. paresis b. delirium tremens c. tabes d. feeble-mindedness
52. **SATISFACTORY SOLUTION : SEEK COUNSEL :: unsatisfactory solution :**
 a. work off b. find new skill c. hold in d. tell a friend
53. **SHORT DISTANCE : LENS ACCOMMODATES :: dim light :**
 a. cornea enlarges b. retina opens c. pupil widens d. sclera closes
54. **COMMUNITY : EPIDEMIC :: world-wide :**
 a. endemic b. parasitic c. pandemic d. endemic
55. **THROAT : DIPHTHERIA :: bone :**
 a. osteomyelitis b. botulism c. rabies d. shingles
56. **MASCULINE : TESTOSTERONE :: feminine :**
 a. exocrine b. estrogen c. pituitary d. thyroxin
57. **OPTOMETRY : EYES :: podiatry :**
 a. ears b. spine c. feet d. nose and throat
58. **SWELLING : SPRAIN :: red streaks :**
 a. infection b. fracture c. internal bleeding d. apoplexy
59. **ACQUIRED : SYPHILIS :: inherited :**
 a. gonorrhoea b. hemophilia c. leukemia d. alcoholism

60. **BLUE CROSS : HOSPITAL COSTS :: Blue Shield :**
 a. compulsory insurance b. out-patient costs c. major hospital expenses
 d. physician's services
61. **CHICKENPOX : LESIONS :: diabetes :**
 a. rash b. bleeding c. vomiting d. thirst
62. **AUTO CRASH : ACCIDENT :: alcoholism :**
 a. crime b. weakness c. illness d. habit
63. **LUNG CANCER : CIGARETTE SMOKING :: lip cancer :**
 a. glass blowers b. pipe smokers c. tobacco chewers
 d. snuff chewers
64. **ABNORMAL : NYMPHOMANIA :: normal :**
 a. bisexual b. heterosexual c. homosexual d. masochism
65. **"STREP" THROAT : RHEUMATIC FEVER :: rheumatic fever :**
 a. epilepsy b. otitis c. rheumatic heart d. scarlet fever
66. **CARBOHYDRATES : GLUCOSE :: proteins :**
 a. fatty acids b. fructose c. glycerin d. amino acids
67. **REPRODUCE : STERILITY :: sex act :**
 a. impotence b. orgasm c. gonads d. circumcision
68. **SUN : SKIN CANCER :: tobacco :**
 a. tetanus b. Buerger's disease c. dysentery d. meningitis
69. **INFLUENZA : VIRUS :: preventable accidents :**
 a. number's up b. act of God c. law of averages d. attitude
70. **INSECT : MALARIA :: soil :**
 a. yellow fever b. Rocky Mountain spotted fever c. tetanus
 d. gonorrhoea
71. **OPTIC : SEEING :: olfactory :**
 a. feeling b. smelling c. touching d. hearing
72. **CONNECTIVE TISSUE : SUPPORT :: epithelial tissue :**
 a. protection b. movement c. mucous membrane d. digestion
73. **THYROID : GOITER :: pancreas :**
 a. acromegaly b. gigantism c. diabetes d. tetany
74. **DISEASE : IMMUNIZATION :: quackery :**
 a. stiffer penalties b. informed public c. improved registration
 procedures d. enforced laws
75. **TONSILS : LYMPH NODULES :: sinuses :**
 a. cavities b. cartilage c. bone d. lymphatic tissue
76. **INHERITED : BLOOD TYPE :: acquired :**
 a. albinism b. tuberculosis c. eye color d. feeble-mindedness
77. **TWO OVA : FRATERNAL :: one ova :**
 a. interlocking b. conjoined c. identical d. dissimilar
78. **HODGKIN'S DISEASE : CANCER :: intuliam :**
 a. botany b. food poisoning c. heredity d. heart disease
79. **CHANGE : SUBSTITUTION :: hern worship :**
 a. sublimation b. egocentrism c. transference d. identification
80. **BEGINNING : MENARCHE :: cessation :**
 a. dysmenorrhoea b. sterility c. dyspnea d. menopause

81. DRUG : PAIN :: alcohol :
a. colds b. snakebite c. exposure d. reasoning
82. SPERM : TESTES, EPIDIDYMIS, URETHRA :: ovum :
a. ovary, Fallopian tube, uterus, vagina b. ovary, vagina, Fallopian tube, urethra
c. ovary, uterus, vagina, Fallopian tube d. ovary, vagina, Fallopian tube, uterus
83. MENSTRUAL FLOW : 1ST-4TH DAYS :: fertile period :
a. 1st-14th days b. 1st-28th days c. 14th-21st days d. 21st-28th days
84. SEDATIVE : BARBITURATES :: stimulant :
a. Benzedrine b. morphine c. heroin d. codeine
85. SYPHILIS : SPIROCHETE :: boils :
a. bad blood b. fungus c. staphylococcus d. dirt
86. WATER : TYPHOID AND CHOLERA :: meat :
a. tapeworm and trichinosis b. hookworm and tapeworm
c. salmonella and hookworm d. trichinosis and hookworm
87. PURSUIT OF PLEASURE : HEDONISTIC :: self-love :
a. romantic b. imitative c. narcissistic d. heterosexual
88. FORGET : REPRESSION :: alibi :
a. sublimation b. displacement c. projection d. rationalization
89. BREAST CANCER : LUMP :: prostate cancer :
a. urinary difficulty b. persistent indigestion c. hoarseness
d. unusual bleeding
90. INFRARED : HEAT :: ultraviolet :
a. vitamin A b. vitamin B c. vitamin C d. vitamin D
91. ACTIVE IMMUNITY : LONG LASTING :: passive immunity :
a. immediate b. absolute c. prolonged d. permanent
92. OSSICLES : CONDUCT SOUND WAVES :: Eustachian tubes :
a. catch germs b. regulate sounds c. carry impulses
d. equalize pressure
93. OFFICIAL HEALTH AGENCY : COUNTY HEALTH DEPARTMENT ::
voluntary health organization :
a. American Cancer Society b. American Medical Association
c. Food and Drug Administration d. American School Health Association
94. JEALOUSY : ENVY :: phobia :
a. resentment b. revenge c. apprehension d. despair
95. LUMP : CANCER :: chancre :
a. syphilis b. chickenpox c. gonorrhoea d. "strep" throat
96. "ACID" : LSD :: "pop pill" :
a. tranquilizer b. narcotic c. amphetamine d. hallucinogen
97. X-RAY : LUNG TUBERCULOSIS :: "pap" smear :
a. cervical cancer b. lung cancer c. breast cancer d. skin cancer
98. GLAUCOMA : PRESSURE :: cataract :
a. reflection b. opacity c. astigmatism d. transparency
99. GRIND LENSES : OPTICIAN :: eye surgery :
a. otologist b. ophthalmologist c. optometrist d. osteopathist
100. ISOTONIC : MOVEMENT :: isometric :
a. muscle b. physique c. static d. action

APPENDIX B
ANSWER KEY FOR ANALOGIES TEST

ANSWER KEY

1. A	26. D	51. B	76. B
2. B	27. A	52. C	77. C
3. B	28. B	53. C	78. B
4. C	29. C	54. C	79. D
5. A	30. C	55. A	80. D
6. B	31. C	56. B	81. D
7. D	32. B	57. C	82. A
8. C	33. B	58. A	83. C
9. C	34. B	59. B	84. A
10. C	35. A	60. D	85. C
11. C	36. A	61. D	86. A
12. D	37. A	62. C	87. C
13. B	38. A	63. B	88. D
14. B	39. B	64. B	89. A
15. D	40. C	65. C	90. D
16. C	41. D	66. D	91. A
17. B	42. D	67. A	92. D
18. D	43. A	68. B	93. A
19. B	44. C	69. D	94. C
20. A	45. A	70. C	95. A
21. D	46. A	71. B	96. C
22. D	47. D	72. A	97. A
23. A	48. D	73. C	98. B
24. A	49. C	74. B	99. B
25. D	50. C	75. A	100. C

APPENDIX C
AREAS OF THE HEALTH ANALOGIES TEST, THE
NUMBER OF QUESTIONS IN EACH AREA, AND
THE SPECIFIC ITEMS FOR EACH AREA

**Health Content Areas of the Analogies Test with
Specific Questions for Each Category**

Area	Total Questions	Number of Items in Category
Disease	20	5, 14, 18, 24, 26, 31, 33, 46, 49, 55, 58, 61, 65, 70, 78, 86, 89, 91, 95, 97
Family Living	17	7, 11, 15, 21, 29, 32, 40, 43, 48, 56, 59, 67, 76, 77, 80, 82, 83
Personal Hygiene	15	1, 20, 34, 36, 38, 41, 50, 53, 71, 72, 75, 85, 92, 98, 100
Community Health	14	16, 22, 25, 27, 35, 45, 54, 57, 60, 69, 74, 90, 93, 99
Mental Health	13	3, 6, 13, 17, 19, 42, 47, 52, 64, 79, 87, 88, 94
Tobacco & Drugs	11	4, 28, 30, 37, 51, 62, 63, 68, 81, 84, 96
Nutrition	10	2, 8, 9, 10, 12, 23, 39, 44, 66, 78

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